

(19) World Intellectual Property  
Organization  
International Bureau



10/523437



(43) International Publication Date  
19 February 2004 (19.02.2004)

PCT

(10) International Publication Number  
WO 2004/015474 A3

(51) International Patent Classification<sup>7</sup>: G02B 6/43, 6/42

(21) International Application Number:

PCT/EP2003/050330

(22) International Filing Date: 22 July 2003 (22.07.2003)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:

1021205 2 August 2002 (02.08.2002) NL

(71) Applicant (for all designated States except US): FCI  
[FR/FR]; 53 rue de Châteaudun, F-75009 PARIS (FR).

(72) Inventors; and

(75) Inventors/Applicants (for US only): MORLION,  
Danny, Louis, Cornelius [BE/BE]; Kriekenrijstraat 30,  
B-9040 GENT (BE). VAN KOETSEM, Jan, Peter, Karel  
[BE/BE]; Wijnakkerslaan 10, B-9150 BAZEL (BE).

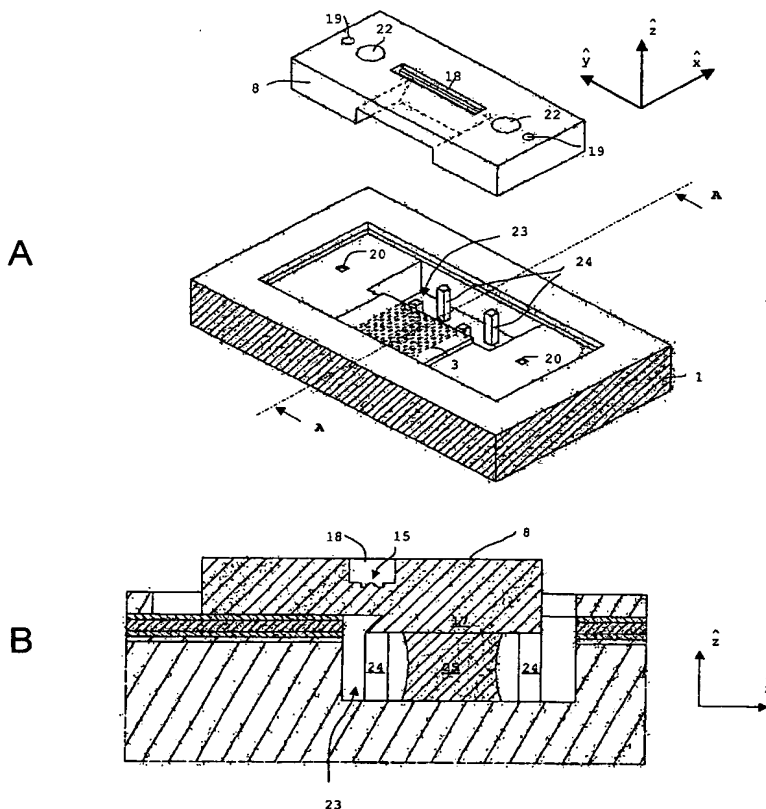
(74) Agent: DE VRIES, Johannes, Hendrik, Fokke; DE  
VRIES & METMAN, Overschiestraat 180, NL-1062 XK  
AMSTERDAM (NL).

(81) Designated States (*national*): AE, AG, AL, AM, AT, AU,  
AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU,  
CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH,  
GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC,  
LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW,  
MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SC, SD, SE,  
SG, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ,  
VC, VN, YU, ZA, ZM, ZW.

(84) Designated States (*regional*): ARIPO patent (GH, GM,  
KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW),  
Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM),  
European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE,  
ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO,  
SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM,  
GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

[Continued on next page]

(54) Title: OPTICAL CONNECTOR ASSEMBLY, COUPLING DEVICE AND METHOD FOR ALIGNING SUCH A COUPLING DEVICE AND A WAVEGUIDE STRUCTURE



(57) Abstract: The invention relates to an optical connector assembly for optically connecting to a waveguide structure in a x-y plane of a layer stack, wherein the connector assembly comprises a coupling device providing a first optical path, and the waveguide structure provides a second optical path, deflecting from said first optical path. The coupling device comprises first reference means adapted to co-operate with second reference means in the layer stack, wherein the second reference means are adapted for aligning the coupling device to the waveguide structure in both the x- and y-direction of the x-y plane as to optically couple the first and second optical path. As a result an optical connector assembly is provided that improves the optical coupling between the optical path in a waveguide structure and in a coupling device and/or a mating optical device. The coupling device may comprise third reference means to couple an optical connector to the waveguide structure. The invention also relates to a method for aligning the coupling device and the waveguide structure.

WO 2004/015474 A3



**Published:**

— with international search report

**(88) Date of publication of the international search report:**

6 May 2004

*For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

## INTERNATIONAL SEARCH REPORT

International Application No.

PCT/EP 03/50330

A. CLASSIFICATION OF SUBJECT MATTER  
 IPC 7 G02B6/43 G02B6/42

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 G02B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, PAJ, INSPEC, WPI Data

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 6 236 788 B1 (MOISEL JOERG) 22 May 2001 (2001-05-22) abstract column 1, line 55 - column 2, line 6	1-12, 14, 15, 18-33
X	WO 96/07117 A (AKZO NOBEL NV ; DOBBELAERE PETER MARTIN CYRIEL (NL); DAELE PETER PA) 7 March 1996 (1996-03-07) abstract figures 2-4, 6, 7, 9, 10	1-34
X	US 5 345 524 A (LEBBY MICHAEL S ET AL) 6 September 1994 (1994-09-06) abstract; figures 1-5	1-35
	-/--	

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

## \* Special categories of cited documents:

- \*A\* document defining the general state of the art which is not considered to be of particular relevance
- \*E\* earlier document but published on or after the international filing date
- \*L\* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- \*O\* document referring to an oral disclosure, use, exhibition or other means
- \*P\* document published prior to the international filing date but later than the priority date claimed

- \*T\* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- \*X\* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- \*Y\* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- \* & \* document member of the same patent family

Date of the actual completion of the international search

10 February 2004

Date of mailing of the international search report

17/02/2004

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2  
 NL - 2280 HV Rijswijk  
 Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,  
 Fax: (+31-70) 340-3016

Authorized officer

Verbandt, Y

## INTERNATIONAL SEARCH REPORT

International Publication No

PCT/EP 03/50330

## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	LINDEN VAN DER J E ET AL: "MICROMACHINED PHOTODIODE SUBMOUNT WITH INTEGRATED MIRROR FOR EFFICIENT OUT-OF-PLANE COUPLING TO PLANAR POLYMERIC WAVEGUIDE CIRCUITS" JAPANESE JOURNAL OF APPLIED PHYSICS, PUBLICATION OFFICE JAPANESE JOURNAL OF APPLIED PHYSICS. TOKYO, JP, vol. 37, no. 6B, June 1998 (1998-06), pages 3730-3735, XP000860818 ISSN: 0021-4922 -----	
A	YOSHIMURA R ET AL: "Low-loss polymeric optical waveguides with 45 degrees mirrors" 1997 6TH MICROOPTICS CONFERENCE AND 14TH TOPICAL MEETING ON GRADIENT INDEX OPTICAL SYSTEMS (MOC/GRIN), TOKYO, JAPAN, 7-9 OCT. 1997, vol. 37, no. 6B, 1997, pages 3657-3661, XP002236555 Japanese Journal of Applied Physics, Part 1 (Regular Papers, Short Notes & Review Papers), June 1998, Publication Office, Japanese Journal Appl. Phys, Japan ISSN: 0021-4922 -----	
A	EP 0 911 658 A (DAIMLER CHRYSLER AG) 28 April 1999 (1999-04-28) -----	
A	US 6 097 864 A (KROPP JOERG-REINHARDT) 1 August 2000 (2000-08-01) -----	
A	PATENT ABSTRACTS OF JAPAN vol. 010, no. 327 (P-513), 7 November 1986 (1986-11-07) & JP 61 133911 A (NIPPON TELEGR & TELEPH CORP), 21 June 1986 (1986-06-21) abstract -----	

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/EP 03/50330

Patent document cited in search report		Publication date		Patent family member(s)	Publication date
US 6236788	B1	22-05-2001	DE	19845227 A1	06-04-2000
			EP	0990931 A2	05-04-2000
WO 9607117	A	07-03-1996	WO	9607117 A1	07-03-1996
US 5345524	A	06-09-1994	JP	6337334 A	06-12-1994
EP 0911658	A	28-04-1999	DE	19746508 A1	29-04-1999
			EP	1312948 A2	21-05-2003
			EP	0911658 A1	28-04-1999
US 6097864	A	01-08-2000	DE	19711121 A1	01-10-1998
JP 61133911	A	21-06-1986	CA	1255382 A1	06-06-1989
			DE	3575208 D1	08-02-1990
			EP	0171615 A2	19-02-1986
			US	4735677 A	05-04-1988
			US	4750799 A	14-06-1988